PHILIPS

Service Information

Advanced Automation Systems
Audio-communications
Broadcast Equipment
Electronic Security & Recording Systems
Industrial Automation
Scientific & Analytical Equipment
Test and Measurement

Industrial & Electro-acoustic Systems Division

860605 TEST AND MEASURING EQUIPMENT OSC 232

OSCILLOSCOPE PM 3055

This service information sheet must be used in combination with Service manual 4822 872 05311

Already published: -

Contents :

1. Erratum
2. Performance check
3. Soldering and desoldering of SMD´s
4. Service menus
5. Options
6. Modifications
7. Remote control socket

4822 872 08336

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1. ERRATUM TO SERVICE MANUAL

* Page 2-7
The correct specification for Delay Time Jitter must be:
1 : >20000 Measured at MTB is 1ms, DTB = 0,5 us and TB MAGN on.

* Page 4-5
The correct reference number for OQ 0203 must be: D1061

* Page 5-9
The connection of R2393 and R2396 must be connected to -17A

* Page 6-4
The correct reference number for R3051, between V3014 and Y2-plate of the CRT must be R3052.

* Page 6-6
The correct type indication for V3251 must be BF423.
The correct reference number for R3252, between potentiometer R3252 and the cathode lead must be R3253.

* Page 7-18
Diodes V4806- V4808 must be drawn reversed.

* Page 9-1
The mains voltage is primary protected by a fuse of 1,6 AT

* Page 13-5
The correct indication near adjusting elements R4108 and R4207 must be 1 ms.

* chapter 14
In behalf of correct handling of the SMD´s (surface mounted devices) on unit 8, please take notice of chapter 3 of this information sheet.

* Page 16-1
Some new codenumbers for mechanical parts are:

Item	Qty	Ordering code	Description
-	3	5322 401 10954	Delay line cable clamp
-	2	5322 255 40054	Heatsink for V3011 and V3012

* Page 16-7
The codenumbers for the cable connectors are:

10 pole cable connector	X4016-X5007-X6007	5322 268 40234
20 pole cable connector	X2010-X3002-X3003-X4002-X4010-X6009	5322 268 40235
26 pole cable connector	X1009-X2009	5322 267 70175
34 pole cable connector	X2001-X4001-X7001	5322 268 40236

The following AMP connectors are available:

2 pole-single, without contact pins	5322 268 40232
3 pole-single, without contact pins	5322 268 40233
bus contact for AMP-cable connector, per piece:	5322 268 20152
5 pole connector for power-in	5322 267 50452
bus contact for connector, per piece:	5322 268 24128

* Page 16-36
The codenumber for V6021-BZX79-C3V0 is: 4822 130 31881

* Page 16-37
New codenumbers for integrated circuits:

Posnr.	Description	Ordering code
D1061	OQ 0203	5322 209 70392
D1161	OQ 0203	5322 209 70392
D2002	OQ 0205	5322 209 70393
D2102	OQ 0205	5322 209 70393
D2301	OQ 0205	5322 209 70393
D2304	OQ 0128	5322 209 82925
D4103	OQ 0201	5322 209 70391
D7001	8052 AH	5322 209 11349
D7004	OQ 0044	5322 209 11008

* Page 16-39
The codenumber for S6001-POWER ON switch-is:
5322 276 11859

2. PERFORMANCE CHECK

The following chapter contains the complete description of the performance check of PM3055. It can be filed under chapter 11 of the Service manual.

2.1 GENERAL INFORMATION

WARNING: Before switching-on, ensure that the instrument has been installed in accordance with the Installation Instructions outlined in Section 2 of the Operating Manual.

This procedure is intended to:
- Check the instruments´specification.
- Be used for incoming inspection to determine the acceptability of newly purchased instruments and/or recently recalibrated instrument.
- Check the necessity of recalibration after the specified recalibration intervals.

Note: The procedure does not check every facet of the instruments calibration; rather, it is concerned primarily with those parts of the instrument which are essential to measurement accuracy and correct operation. Removing the instruments covers is not necessary to perform this procedure. All checks are made from the outside of the instrument.

If the test is started within a short period after switching-on, bear in mind that steps may be out of specification, due to insufficient warming-up time.
Warming-up time under average conditions is 30 minutes.

The performance checks are made with a stable, well-focussed, low-intensity display. Unless otherwise noted, adjust the intensity and trigger-level controls as needed.

IMPORTANT:
NOTES * At the start of every check, the controls always occupy the preliminary settings AUTO SET position, unless otherwise stated.

* The input voltage has to be supplied to the A-input; unless otherwise stated.
  Set the TIME/DIV switches to a suitable position; unless otherwise stated.

* Tolerances given are for the instrument under test and do not include test equipment error.

* In this chapter in some checks channel B is mentioned between brackets behind channel A. It is advised to perform first channel A checks. After that the checks for channel B can be done.

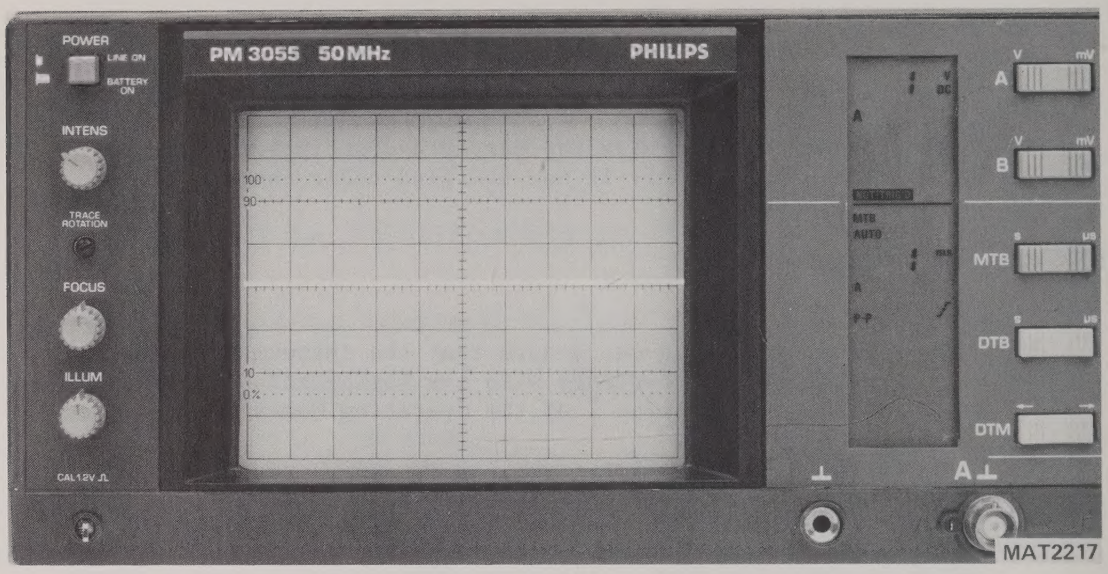

fig. 2.1 RESTART condition

2.2 PRELIMINARY SETTINGS

- Switch-on the instrument (no input signal).
- Check if all LCD segments are on for approx. 1 sec.
- Press MENU and AUTO SET.
- Check if the frontcontrols are set in sequence in the restart condition as indicated in fig. 2.1.
- At the start of every check only AUTO SET must be pressed (after the input signal is applied).

2.3 RECOMMENDED TEST EQUIPMENT

The test equipment that must be used for this performance check is as given in section 13.2 of the Service manual, except:

Trimming tool kit
Oscilloscope
Digital multimeter

2.4 CHECKING PROCEDURE

2.4.1 POWER SUPPLY (characteristics: 2.5)

* SUBJECT — Line voltage input

TEST EQUIPMENT — Variable mains transformer

MAINS VOLTAGE — Between 90 V and 264 V ac (r.m.s.)
Frequency: 45 Hz...440 Hz

SETTINGS
- Press POWER ON
- Apply CAL signal to input A
- Press AUTO SET

REQUIREMENTS
- Starts at any mains voltage between 90 V...264 V ac (r.m.s.)
- Instruments performance does not change over indicated mains voltage range; displayed CAL signal distortion-free and with equal intensity.

MEASURING RESULTS

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* SUBJECT — Power Consumption (ac source)

TEST EQUIPMENT — Wattmeter (moving iron meter)

MAINS VOLTAGE — Mains voltage 220 V (r.m.s.).

SETTINGS — Press POWER ON

REQUIREMENTS
Accessories excluded : 45 W (typical)
Maximum : <50 W

MEASURING RESULTS

2.4.2 DISPLAY (characteristics section 2.1)

* SUBJECT — Illumination

TEST EQUIPMENT — -

INPUT VOLTAGE — -

SETTINGS	Operate ILLUM control (fully clockwise)
REQUIREMENTS	- Check if the graticule raster is equaly illuminated and if the intensity can be controlled continuously.
MEASURING RESULTS	

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* SUBJECT	Trace Rotation
TEST EQUIPMENT	-
INPUT VOLTAGE	-
SETTINGS	- Operate screwdriver adjustment: TRACE ROT
REQUIREMENTS	Trace must be in parallel with the horizontal graticule line. Direction of screwdriver rotation same as direction of trace rotation.
MEASURING RESULTS	

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* SUBJECT	Orthogonality
TEST EQUIPMENT	LF sine-wave generator
INPUT VOLTAGE	Sine-wave signal 50 Hz...60 Hz
SETTINGS	- Set trace exactly in parallel with horizontal graticule line (see section: Trace rotation) - Apply a sine wave signal to input A. (50 Hz...60 Hz) - Set trace height to 8 div. - Press X DEFL. - Press TRIG or X SOURCE and select B as MTB trigger source
REQUIREMENTS	- Check if vertical line is in parallel with the vertical graticule line in the centre of the screen. - Angle with respect to horizontal line must be 90^{o} +or- 1^{o}
MEASURING RESULTS	

*	SUBJECT	LCD check
	TEST EQUIPMENT	-
	INPUT VOLTAGE	-
	SETTINGS	- Press MENU and keep it pressed - Then press AUTO SET - Check if LCD indicates "1°", "2°" and "3°" - Press "S" of DTB UP-DOWN control - Press MENU, 8 times - To leave this test: press MENU and then AUTO SET
	REQUIREMENTS	- Check if all segments of the LCD are on (see fig. 3.2 of the Operating manual)
	MEASURING RESULTS	

2.4.3 VERTICAL DEFLECTION OR Y-AXIS (characteristics section 2.2)

*	SUBJECT	Vertical Deflection
	TEST EQUIPMENT	LF Square wave generator
	INPUT VOLTAGE	Square wave signal 1 kHz to A
	SETTINGS AND REQUIREMENTS	- Set trace height to 5 div. - Check if one square wave signal of 5 div. is displayed. - Press A/B; channel A and B on - Check if a square wave signal (A) and line (B) is displayed and if A and B are on. - Press ALT/CHOP - Check if ALT or CHOP is active. - Press TRIG VIEW. - Check if two square wave signals (A and TRIG VIEW) and a line (B) are displayed - Press TRIG VIEW; Check if A and B are on.
	INPUT VOLTAGE	Square wave signal 1 kHz to input A and B

SETTINGS AND REQUIREMENTS	- Press AUTO SET - Check if A, B and ALT are on - Set trace height to 4 div. - Press AC/DC of channel A and B for DC input coupling - Press ADD/INVERT twice for ADD mode. - Check if 3 square wave signals are displayed: channels A and B each 4 div. trace height and A+B with 8 div. trace height. - Press ADD/INVERT once more for ADD and INVERT mode - Check if 2 square waves of 4 div. (A and B) and a line is displayed (A-B)
MEASURING RESULTS	

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* SUBJECT — Vertical Deflection coefficients and input coupling of Channels A and B (characteristics section 2.2.1)

TEST EQUIPMENT — Square-wave calibration generator (PG506)

INPUT VOLTAGE — Square-wave signal 1 kHz to input A(B), amplitude 10 mVpp...20 Vpp in 1-2-5 steps

SETTINGS AND REQUIREMENTS
- Apply a 1 kHz square wave signal of 5 mV to input A(B)
- Set A (B) to 2 mV/div.
- Check if the amplitude of the signal is 5 div. (+or- 3%)
- Increase the input amplitude and vertical sensitivity with the following steps:

Input voltage (pp)	A (B) setting	Requirements	Measuring results
10 mV	2 mV	5 div.(+or-3%)	
20 mV	5 mV	4 div.(+or-3%)	
50 mV	10 mV	5 div.(+or-3%)	
0,1 V	20 mV	5 div.(+or-3%)	
0,2 V	50 mV	4 div.(+or-3%)	
0,5 V	100 mV	5 div.(+or-3%)	
1 V	200 mV	5 div.(+or-3%)	
2 V	500 mV	4 div.(+or-3%)	
5 V	1 V	5 div.(+or-3%)	
10 V	2 V	5 div.(+or-3%)	
20 V	5 V	4 div.(+or-3%)	
50 V	10 V	5 div.(+or-3%)	

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* SUBJECT — Variable gain control range (continued procedure of previous subject)

SETTING — - Turn VAR control fully anti-clockwise

REQUIREMENTS — - Check if displayed amplitude <2 div. (1:>2,5)

MEASURING RESULTS

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* SUBJECT — Input coupling (continued procedure of previous subject)

SETTINGS AND REQUIREMENTS
- Turn VAR control fully clockwise.
- Press "0"; check if input signal is interrupted.
- Press "0" again and then AC/DC
- Check if in DC position the signal shifts upwards

MEASURING RESULTS

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* SUBJECT — Input impedance and capacitance

TEST EQUIPMENT — Calibrated square-wave signal 1 kHz (PG506) via input dummy to input A(B).
Dummy for input: 1 Mohm resistor in parallel with a capacitor of 20 pF.

1 Mohm Input impedance

INPUT VOLTAGE — Square-wave signal 1 kHz to input A(B) via dummy,amplitude 20 mVpp...100 Vpp in 1-2-5 steps

SETTINGS AND REQUIREMENTS
- Apply calibrated square-wave signal of 20 mV via dummy to input A(B)
- Check the amplitude of the displayed signals according the table below:

Input voltage (pp) via dummy	A(B) setting	Requirements	Measuring results
20 mV	2 mV	5 div.(+or-2%)	
50 mV	5 mV	5 div.(+or-2%)	
0,1 V	10 mV	5 div.(+or-2%)	
0,2 V	20 mV	5 div.(+or-2%)	
0,5 V	50 mV	5 div.(+or-2%)	
1 V	100 mV	5 div.(+or-2%)	
2 V	200 mV	5 div.(+or-2%)	
5 V	500 V	5 div.(+or-2%)	
10 V	1 V	5 div.(+or-2%)	
20 V	2 V	5 div.(+or-2%)	
50 V	5 V	5 div.(+or-2%)	
100 V	10 V	5 div.(+or-2%)	

- Remove input signal.

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* SUBJECT — Frequency response

TEST EQUIPMENT — Constant amplitude sine-wave generator (SG503)

INPUT VOLTAGE — Constant amplitude sine-wave signal, 120 mV frequency 50 kHz...50 MHz to input A (B).

SETTINGS AND REQUIREMENTS

- Set A (B) to 20 mV/div.
- Apply 50 kHz sine-wave signal to A (B)
- Adjust trace height to exactly 6 div.
- Increase the frequency of the input signal up to 50 MHz.
- Check if the vertical deflection is $\geq$ 4,2 div. (-3 dB) over the complete bandwidth range (>50 MHz).
- Reduce the amplitude of the input signal to 12 mV and the frequency to 50 kHz.
- Set A (B) to 2 mV.
- Adjust the trace height to exactly 6 div.
- Increase the frequency up to 35 MHz.
- Check if the vertical deflection is $\geq$ 4,2 div. (-3 dB) over the complete bandwidth range (>35 MHz)

MEASURING RESULTS

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* SUBJECT — Rise-Time

IMPORTANT — THE RISE TIME IS A CALCULATED VALUE, ACCORDING FORMULA: BANDWIDTH X RISE-TIME = 0,35

TEST EQUIPMENT — Fast-rise square-wave generator (PG506)

INPUT VOLTAGE — Fast-rise square-wave signal $\leq$ 1 ns to input A (B) frequency: 1MHz.

SETTINGS
- Set A(B) to 50 mV/div
- Press TB MAGN
- Set MAIN TB to 5 ns/div
- Adjust the trace height exactly between the dotted lines 0% and 100% (5 div.)

REQUIREMENTS — Important: $T_R(\text{measured}) = \sqrt{T_R(\text{input signal})^2 + T_R(\text{oscilloscope})^2}$

- Check the rise-time, measured between the 10% and 90% lines (4 div.);
* rise-time must be: 7 ns or less (1,4 subdiv. or less).

MEASURING RESULTS

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* SUBJECT — Pulse response

TEST EQUIPMENT — Fast-rise square-wave generator (PG506)

INPUT VOLTAGE — Fast-rise square-wave signal ($\leq$ 1 ns) to input A (B)

SETTINGS AND REQUIREMENTS

Note: Take the pulse distortion of the calibration generator (2%) into account when performing the now following calibration steps. The pulse response of the signal at the output of the generator is optimal with max. pulse amplitude.

- The required fast rise-time square-wave must be obtained from the square-wave generator.
- Adjust channel A (B) to an input sensitivity of 20 mV/div.
- Select DC input coupling for channel A (B)
- Apply a 1 MHz/5 div. (+ and - 2,5 div) square-wave signal with a rise-time of 1 ns to input A (B)
- Set the MAIN TB to 50 ns/div.
- Press TB MAGN on.

		- Check the pulse response; * Overshoot, ringing and rounding: <1,5 subdiv. p-p * Duration of ringing: 20 ns (ringing must be ended when amplitude is 1/3 of starting amplitude * Hole or bump: <0,7 subdiv (peak) * Drop or tilt: <0,7 subdiv (peak)
	MEASURING RESULTS	

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*	SUBJECT	Noise
	TEST EQUIPMENT	-
	INPUT VOLTAGE	-
	SETTINGS	- Set channel A and B to 20 mV/div - Press A/B: channel A and B on - Press ALT/CHOP for CHOP mode - Press AC/DC of both channels for DC input coupling
	REQUIREMENT	- Check if the traces are not thicker than 0,5 subdiv.
	MEASURING RESULTS	

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*	SUBJECT	Vertical Dynamic range
	TEST EQUIPMENT	Constant amplitude sine-wave generator
	INPUT VOLTAGE	Sine-wave signal of 10 MHz, 2,4 Vpp to input A(B)

SETTINGS	- Apply sine-wave signal of 10 MHz, 2,4 Vpp to input A(B). - Set A (B) to 100 mV/div. - Shift with the Y POS control the sine-wave vertically over the screen.
REQUIREMENT	- Check if the top and bottom of the sine-wave signal can be displayed distortion-free (24 div. trace height).
INPUT VOLTAGE	Sine-wave signal of 50 MHz, 1,6 Vpp to input A(B)
SETTINGS	- Set A (B) to 200 mV/div. - Set the trace height to exactly 8 div. - Increase the frequency of the input signal up to 50 MHz
REQUIREMENT	- Check if a sine-wave signal of 8 div. is displayed distortion-free.
MEASURING RESULTS	

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*	SUBJECT	Position range (vertical)
	TEST EQUIPMENT	LF Sine-wave generator
	INPUT VOLTAGE	Sine-wave signal of 1 kHz, 8 V to input A(B)
	SETTINGS	- Adjust the channel A (B) input sensitivity to 1 V/div. - Apply a sine-wave of 1 kHz/8 div. to the channel A (B) input. - Adjust the channel A (B) input sensitivity to 500 mV/div. - Rotate the channel A (B) Y POS control fully clockwise and anti-clockwise
	REQUIREMENT	- Check if the top and the bottom of the signal can be positioned on the vertical centre line of the screen.
	MEASURING RESULTS	

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* SUBJECT — Decoupling factor between channels A and B at 10 MHz

TEST EQUIPMENT — Sine-wave calibration generator (SG503)

INPUT VOLTAGE — Sine-wave signal 10 MHz, 4 V to input A(B)

SETTINGS
- Set channel A and B to 0,5 V/div.
- Apply sine-wave input signal to input A(B)
- Press AUTO SET
- Set the trace height to 8 div.
- Press A/B (channel with input signal off).

REQUIREMENTS
- Check if trace height of channel without input signal B(A) is < 0,08 div. (1:>100)

MEASURING RESULTS

---

* SUBJECT — Decoupling factor between channels A and B at 50 MHz

TEST EQUIPMENT — HF sine-wave generator (SG503)

INPUT VOLTAGE — 50 MHz sine-wave signal, 4 V to input A(B)

SETTINGS
- Do the same settings as indicated above

REQUIREMENTS
- Check if trace height of channel without input signal B(A) is <1,6 div. (1:>50)

MEASURING RESULTS

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* SUBJECT — Common Mode Rejection Ratio

TEST EQUIPMENT — HF constant Amplitude sine-wave generator (SG503)

INPUT VOLTAGE — Sine wave signal 1 MHz, 4 Vpp to inputs A and B

SETTINGS
- Set A and B to 500 mV/div. (8 div.)
- Set input coupling of channels A and B to DC
- Adjust the VAR controls for minimum trace height difference of channel A and B
- Press ADD/INVERT three times (ADD and INVERT on)

	REQUIREMENT	- Check if the trace height of the A-B signal is < 0,08 div.
	MEASURING RESULTS	

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*	SUBJECT	LF linearity (vertical)
	TEST EQUIPMENT	LF square-wave generator
	INPUT VOLTAGE	Square-wave signal 50 kHz, 200 mV to input A(B)
	SETTINGS	- Set A (B) to 100 mV/div. - Set the square-wave signal in the vertical centre of the screen. - Adjust the square-wave signal to exactly 2 div. trace height. - Shift the signal with the Y POS control to the two upper and lower div. of the screen.
	REQUIREMENT	- Check if the trace height in the two upper and lower div. is 2 div. (max. ampl. deviation must be <3%)
	MEASURING RESULTS	

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*	SUBJECT	Visual Signal Delay
	TEST EQUIPMENT	Square wave calibration generator (PG506)
	INPUT VOLTAGE	Fast-rise input signal 1 MHz, $\leq$1 ns, 0,5 V to input A
	SETTINGS	- Apply fast-rise input signal to input A - Press AUTO SET - Set A to 100 mV/div. - Set MAIN TB to 50 ns/div. - Press TB MAGN and turn X POS - Set INTENSITY fully clock-wise - Press TRIG VIEW and A/B 3 times - Press A/B three times (only TRIG VIEW signal displayed)
	REQUIREMENT	- Check if visual signal delay is >15 ns
	MEASURING RESULTS	

*	SUBJECT	Base line jump
	TEST EQUIPMENT	-
	INPUT VOLTAGE	-
	SETTINGS	Attenuator balance

- This check must be done in the SERVICE MENU "1". To enter this menu proceed as follows:
- Press MENU and keep it pressed and then press AUTO SET
- Press V of channel A UP-DOWN control
- Check LCD display: "1.0" flashing
- The attenuator is now switched between the 1-2-5 positions
- Check if the base line do not jump more than 1,5 subdiv.

VAR balance

- Press MENU; "1.1" flashing in LCD
- Rotate VAR control of channel A and B
- Check if the base lines do not jump more than 1 subdiv.

X1/X10 attenuator offset

- Press MENU; "1.2" flashing in LCD
- Check if the base lines do not jump more than 1 subdiv.

NORMAL-INVERT jump

- Press MENU four times; "1.6" flashing in LCD
- Check if the displayed point does not jump more than 1 subdiv.
- Press AUTO SET two times to leave the SERVICE MENU

MEASURING RESULTS

2.4.4 TRIGGER VIEW (characteristics section 2.2.2)

*	SUBJECT	Deflection coefficient via A, B and EXT.
	TEST EQUIPMENT	Square-wave calibration generator (PG506)
	INPUT SIGNAL	Square-wave signal 1 kHz, amplitude given in table.

TRIG VIEW via A(B)

SETTINGS	- Apply the square-wave signal to input A(B) - Press TRIG VIEW (TRIG VIEW and A(B) on) - Select A(B) as MTB trigger source - Select DC for MTB trigger coupling
REQUIREMENT	- Check the amplitude of the TRIG VIEW signal according the table given in section 3.2 of this performance check. IMPORTANT: the error limit of the amplitudes displayed via TRIG VIEW is <5%!!
MEASURING RESULTS	

TRIG VIEW via EXT

INPUT SIGNAL	Square-wave signal 1 kHz, 500 mV to input MTB TRIG or X DEFL.
SETTINGS	- Select EXT as MTB trigger source.
REQUIREMENT	- Check if the square-wave signal displayed via TRIG VIEW has an amplitude of 5 div. (+or- <5%)
MEASURING RESULTS	

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*	SUBJECT	Frequency response INT and EXT (TRIGGER VIEW)
	TEST EQUIPMENT	Constant amplitude sine-wave generator INT (via A and B)
	INPUT VOLTAGE	Constant amplitude sine-wave signal, 120 mV, freq. 50 kHz...50 MHz to input A(B)
	SETTINGS	- Set A(B) to 20 mV/div. - Adjust the trace height to exactly 6 div. - Press TRIG VIEW (TRIG VIEW and A on) - Select A(B) as MTB trigger source and p-p as MTB trigger coupling - Increase the frequency up to 50 MHz
	REQUIREMENTS	- Check if the vertical deflection via TRIG VIEW is > 4,2 div.
	MEASURING RESULTS	

EXT

INPUT VOLTAGE	Constant amplitude sine-wave signal, 600 mV, freq. 50 kHz...50 MHz to input EXT
SETTINGS	- Select EXT DC as MTB trigger source - Adjust the trace height to exactly 6 div. - Increase the frequency up to 50 MHz.
REQUIREMENT	- Check if the vertical deflection via TRIG VIEW is > 4,2 div.
MEASURING RESULTS	

---

*	SUBJECT	Lower -3dB point of trigger view
	TEST EQUIPMENT	LF sine-wave generator
	INPUT VOLTAGE	Sine-wave signal of 10 Hz, 600 mV to input EXT
	SETTINGS	- Select EXT DC as MTB trigger source - Select TRIG VIEW as vertical display mode (TRIG VIEW and A) - Apply a 10 Hz, 600 mV sine-wave signal to input EXT - Decrease the frequency of the input signal, till the displayed amplitude is 4,2 div.
	REQUIREMENTS	- Check if the frequency of the input signal is much lower than 10 Hz (≈5Hz)
	MEASURING RESULTS	

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*	SUBJECT	Line jump trigger source
	TEST EQUIPMENT	-
	INPUT VOLTAGE	-
	SETTINGS	- Press TRIG VIEW (TRIG VIEW and A on) - Press TRIG or X SOURCE four times
	REQUIREMENTS	- Check if A, A and B, B, EXT DC and LINE are displayed via trigger view and if the jump between base line and the start of the LINE signal is < 2 subdiv.

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*	SUBJECT	OFFSET of trigger point
	TEST EQUIPMENT	-
	INPUT VOLTAGE	-
	SETTINGS AND REQUIREMENT	- This check must be done in the SERVICE MENU "1°"To enter this menu proceed as follows: - Press MENU and keep it pressed and then press AUTO SET - Press V of channel A UP-DOWN control - Press MENU three times; "1.3" in LCD flashing - Turn Y POS of channel B and set the point in vertical centre of the screen. - Check if the displayed point does not jump more than 1,5 subdiv horizontally - Press MENU; "1.4" in LCD flashing - Turn Y POS of A and set point in the vertical centre - Check if the displayed point does not jump more than 1,5 subdiv. horizontally - Press MENU; "1.5" in LCD flashing - Turn Y POS of B and set point in vertical centre - Check if the displayed point does not jump more than 1,5 subdiv. - Press AUTO SET two times to leave the SERVICE MENU
	MEASURING RESULTS	

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*	SUBJECT	Delay Difference between input A (B) and ext.TRIG VIEW
	TEST EQUIPMENT	Square wave calibration generator. (PG506)- 50 ohm T piece PM9584 and 50 ohm terminator (for EXT)
	INPUT VOLTAGE	Fast-rise input signal 1MHz, 0,5V, $\leq$1ns via 50 ohm T piece to input A/B and EXT input via 50 ohm terminator
	SETTINGS	- Apply fast-rise input signal to input A and EXT - Press AUTO SET and TRIG VIEW - Press TRIG or X SOURCE for EXT DC (AC) triggering - Set of A to 100mV - Press TB MAGN - Set INTENSITY fully clock-wise - Set MAIN TB to 5ns

	REQUIREMENTS	- Check if delay difference between the two displayed signal slopes is <10 ns (<2 div.)
	MEASURING RESULTS	

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*	SUBJECT	Dynamic Range (EXT input via trigger view)
	TEST EQUIPMENT	Constant amplitude sine-wave generator
	INPUT VOLTAGE	Sine-wave signal of 1 MHz, 2,4 Vpp to input EXT
	SETTINGS	- Press TRIG VIEW (TRIG VIEW and A on) - Select EXT as MTB trigger source - Apply sine-wave signal 1 MHz, 2,4 V to input EXT - Shift with the MTB LEVEL control the sine-wave signal displayed via TRIG VIEW vertically over the screen.
	REQUIREMENT	- Check if the top and bottom of the sine-wave signal can be displayed distortion free (24 div. trace height)
	MEASURING RESULTS	
	INPUT VOLTAGE	Sine-wave signal of 50 MHz, 600 mVpp to input EXT
	SETTINGS	- Press TRIG VIEW on - Select EXT as MTB trigger source - Apply a sine-wave signal of 50 MHz, 600 mV to input EXT.
	REQUIREMENT	- Check if a sine-wave signal of 6 div. is displayed distortion-free
	MEASURING RESULTS	

2.4.5 HORIZONTAL DEFLECTION OR X-AXIS (characteristics section 2.3)

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*	SUBJECT	Horizontal Display modes and trace separation
	TEST EQUIPMENT	LF sine-wave generator

INPUT VOLTAGE	Sine wave signal 2 kHz, 3 div. trace height to input A
SETTINGS AND REQUIREMENTS	- Press AUTO SET - Set the trace height to 3 div. (MTB trace) - Set the MAIN TB to 0,5 ms/div. - Press TB SELECT - Set the DEL TB to 50 us/div. - Check if intensified part (DTB) is visible and if it can be shifted horizontally by the DTM control - Press TB SELECT - Check if DTB and MTB INTENS are on - Set the MTBI trace on the upper 3 div. - Turn TRACE SEP fully counter clockwise - Check if the bottom/half of the DTB signal can be > 4 div. shifted from the 100% graticule line - Set the MTBI trace on the lower 3 div. - Turn TRACE SEP fully clockwise - Check if the top half of the DTB signal can be > 4 div shifted from the 0% graticule line - Press TB SELECT - Check if only the DTB trace is displayed - Press TB SELECT - Check if only the MTB trace is displayed - Press X DEFL - Check if only X DEFL is on - Select A of MTB trigger source - Check if a line under an angle of 45^{o} is displayed.
MEASURING RESULTS	

---

*	SUBJECT	Deflection coefficient (MTB)
	TEST EQUIPMENT	Time marker generator (TG501)
	INPUT VOLTAGE	Time marker signal 50 ns...0,5 s
	SETTINGS	- Apply a time marker signal of 50 ns to input A - Press AUTO SET

REQUIREMENT - Check the deflection coefficients in TB X1 and TB X10 according the table below:

Time marker pulse	MAIN TB setting ../div	Max. coeff. error MTB X1	Max. coeff. error MTB X10 TB MAGN on	Measuring results
50 ns	50 ns	3%	4%	(excl. first and last 50 ns)
0,1 us	0,1 us	3%	4%	
0,2 us	0,2 us	3%	4%	
0,5 us	0,5 us	3%	4%	
1 us	1 us	3%	4%	
2 us	2 us	3%	4%	
5 us	5 us	3%	4%	
10 us	10 us	3%	4%	
20 us	20 us	3%	4%	
50 us	50 us	3%	4%	
0,1 ms	0,1 ms	3%	4%	
0,2 ms	0,2 ms	3%	4%	
0,5 ms	0,5 ms	3%	4%	
1 ms	1 ms	3%	4%	
2 ms	2 ms	3%	4%	
5 ms	5 ms	3%	4%	
10 ms	10 ms	3%	4%	
20 ms	20 ms	3%	4%	
50 ms	50 ms	3%	4%	
0,1 s	0,1 s	3%	4%	
0,2 s	0,2 s	3%	4%	
0,5 s	0,5 s	3%	4%	

* SUBJECT — Horizontal position range

TEST EQUIPMENT — Time marker generator (TG501)

INPUT VOLTAGE — Time marker signal of 1 ms to input A

SETTINGS AND REQUIREMENTS
- Set MAIN TB to 0,1 ms/div.
- Set a marker pulse on the first and last vertical graticule line
- Set X POS fully clockwise.
- Check if the first marker pulse is at the right side of the horizontal centre line
- Set X POS fully anti-clockwise
- Check if the last marker pulse is at the left side of the horizontal centre line.

MEASURING RESULTS

*	SUBJECT	Variable control ratio (VAR MTB) and TB Magnifier balance
	TEST EQUIPMENT	Time marker generator (TG501)
	INPUT VOLTAGE	Time marker signal 1 us to input A
	SETTINGS	- Set MAIN TB to 0,2 us/div; marker on first and sixth graticule line - Set the MTB VAR fully anti-clockwise
	REQUIREMENT	- Check if the VAR control range overlaps the time base steps 0,2 us to 0,5 us; first marker on first graticule line and second marker on the third graticule line or closer to the first marker (2,5:1)
	SETTINGS	- Set the MTB VAR control fully clockwise - Set the top of the second marker pulse exactly in the horizontal centre of the graticule - Press TB MAGN (on)
	REQUIREMENT	- Check if the top of the second marker pulse is not shifted more than 2,5 subdiv.
	MEASURING RESULTS	

*	SUBJECT	Variable Hold Off
	TEST EQUIPMENT	Time marker generator (TG501)
	INPUT VOLTAGE	Time marker signal 10 ns to input A
	SETTINGS	- Set Hold-off control fully clockwise - Turn Hold-off anti-clockwise
	REQUIREMENT	- Check if the trace intensity decreases with a factor of 10 times the minimum Hold Off
	MEASURING RESULTS	

*	SUBJECT	Deflection Coefficients (DTB)
	TEST EQUIPMENT	Time marker generator (TG501)
	INPUT VOLTAGE	Time marker signal 1 ms...50 ns to input A

SETTINGS
- Press AUTO SET
- Press TB SELECT; MTBI and DTB on
- Set MAIN TB to 2 ms/div.
- Set DEL´D TB to 1 ms/div.
- Press DTB TRIG for STARTS mode
- Set the delay time to 5.000 ms by means of the DTM control.

REQUIREMENTS
- Check the deflection coefficients in TB x 1 and TB x 10 according the table below:

Attention: To check the DTB time coefficients according the table below the uS ofUP-DOWN MTB control must be operated (DTB setting is electrically coupled with MTB setting)

MAIN TB setting	Time marker pulse	DEL´D TB setting ../div	Max.coeff.error MTB X1	Max.coeff.error MTB X10	Measuring results
2 ms	1 ms	1 ms	3%	4%	
1 ms	0,5 ms	0,5 ms	3%	4%	
0,5 ms	0,2 ms	0,2 ms	3%	4%	
0,2 ms	0,1 ms	0,1 ms	3%	4%	
0,1 ms	50 us	50 us	3%	4%	
50 us	20 us	20 us	3%	4%	
20 us	10 us	10 us	3%	4%	
10 us	5 us	5 us	3%	4%	
5 us	2 us	2 us	3%	4%	
2 us	1 us	1 us	3%	4%	
1 us	0,5 us	0,5 us	3%	4%	
0,5 us	0,2 us	0,2 us	3%	4%	
0,2 us	0,1 us	0,1 us	3%	4%	
0,1 us	50 ns	50 ns	3%	4%	

* SUBJECT — Delay Time Multiplier

TEST EQUIPMENT — Time marker generator (TG501)

INPUT VOLTAGE — Time marker signal 10 us to input A

SETTINGS AND REQUIREMENTS	- Press TB SELECT; MTB INTENS and DTB on - Set MAIN TB to 5 us/div - Set DEL´D TB to 0,5 us/div. - Press DTM <-- (delay time: 0) - Check if the first marker pulse displayed via the DTB is partly visible; - Set the first marker displayed via the MTB exactly on the first graticule line - Press DTM --> (delay time 50 us) - Check if the last marker pulse displayed via the DTB is completely visible and if the Delay Time displayed in the LCD is >48 us. (3% + 1% incremental delay time error + [25 ns +/- 5 ns])
MEASURING RESULTS	

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*	SUBJECT	Maximum Jitter (DTB)
	TEST EQUIPMENT	Sine-wave generator
	INPUT SIGNAL	Sine-wave signal (1 MHz), 6 div. trace height to input A.
	SETTINGS	- Set the trace height to 6 div. - Set MAIN TB to 1 ms - Press TB SELECT; MTBI and DTB on - Set DEL´D TB to 0,5 us - Set the DELAY time to 5 ms - Press TB SELECT; only DTB on
	REQUIREMENT	- Check if the jitter of the DTB trace is $\leq$ 1 div. (1 part per 20.000)
	MEASURING RESULTS	

---

*	SUBJECT	Horizontal Deflection coefficients
	TEST EQUIPMENT	Sine wave generator
	INPUT VOLTAGE	Sine wave signal 2 kHz, 4 div. trace height to input A
	SETTINGS	- Press EXT X DEFL - Press A/B twice for only ch. B display - Select A as X DEFL source with TRIG or X SOURCE
	REQUIREMENT	- Check if a horizontal line of 4 div. is displayed (+or- 5%).

INPUT VOLTAGE	- Sine wave signal 2 kHz, 1 V to input EXT
SETTINGS AND REQIREMENTS	- Select EXT with TRIG or X SOURCE - Press X DEFL - Check if a horizontal line of 10 div. (+or- 5%) is displayed. - Select LINE with TRIG or X SOURCE - Check if a horizontal line is displayed of approx 6 div. (at 220 V mains voltage)
MEASURING RESULTS	

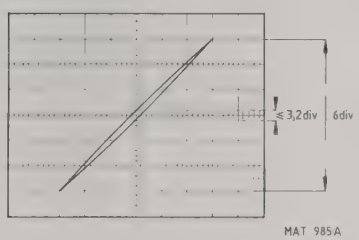
---

*	SUBJECT	Frequency response (horizontal)
	TEST EQUIPMENT	Constant amplitude sine-wave generator (PG506)
	INPUT VOLTAGE	Constant amplitude sine-wave signal, 30 mV, 50 kHz...2 MHz to input A
	SETTINGS	- Set A to 5 mV/div - Apply a 50 kHz sine-wave signal to input A - Adjust the trace height to exactly 6 div. - Press X DEFL - Select A as horizontal deflection source with TRIG or X SOURCE - Adjust the input voltage for exactly 6 div. horizontal deflection - Increase the frequency of the input signal up to 2 MHz
	REQUIREMENTS	- Check if the trace width is > 4,2 div. (-3 dB) over the complete bandwidth range.
	MEASURING RESULTS	
	TEST EQUIPMENT	LF Sine-wave generator
	INPUT VOLTAGE	Sine-wave signal, 10 Hz, 6 div. trace height to input A
	SETTINGS	- Set the vertical deflection of A to exactly 6 div. - Select X DEFL and A as X DEFL source - Decrease the frequency of the input signal.

	REQUIREMENT	- Check if the frequency of the input signal is much lower than 10 Hz at a trace width of 4,2 div.
	MEASURING RESULTS	

---

*	SUBJECT	Maximum phase shift between horizontal and vertical deflection.
	TEST EQUIPMENT	LF sine-wave generator
	INPUT VOLTAGE	Sine wave signal, 2 kHz...100 kHz, trace height 6 div.
	SETTINGS	- Press X DEFL - Select A for horizontal deflection with TRIG or X SOURCE - Set the trace height to exactly 6 div. - Increase the input frequency up to 100 kHz.
	REQUIREMENT	- Check if the phase shift < 3^{o} (see Fig. below)



	MEASURING RESULTS	

2.4.6 MTB TRIGGERING (characteristics, section 2.4.1)

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*	SUBJECT	MTB Trigger Sources and trigger coupling
	TEST EQUIPMENT	Square-wave generator
	INPUT VOLTAGE	Square-wave signal 2 kHz, 4 div. trace height to input A (EXT)

SETTINGS AND REQUIREMENTS	- Set the trace height to 4 div. - Press TRIG VIEW (A and TRIG VIEW on) - Press TRIG COUPL and select DC - Adjust LEVEL MTB for a triggered signal - Check if two square wave signals are displayed of 4 div. (Trigger view and A) - Press TRIG COUPL and select p-p - Turn LEVEL MTB and check if the signal is triggered over the complete level range. - Connect CAL signal to input B - Set B to 200 mV. - Select B as MTB trigger source with TRIG or X SOURCE (A is not triggered) - Check if a square wave of 6 div. is displayed - Increase the freq. of the square-wave signal to input A up to 20 kHz (CAL signal to B) - Press TRIG or X SOURCE four times (A and B selected.) - Check if three well triggered traces are displayed; TRIG VIEW signal derived from A. - Remove input signals - Apply a square wave signal of 500 mV to input EXT - Select EXT as MTB trigger source with TRIG or X SOURCE - Check if a square wave signal is displayed via TRIG VIEW of 5 div. - Select LINE as MTB trigger source with TRIG or X SOURCE - Set MAIN TB to 5 ms/div - Check if a sine-wave signal (mains frequency) is displayed.
MEASURING RESULTS	

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*	SUBJECT	MTB Slope selection and Level control range.
	TEST EQUIPMENT	LF Sine-wave generator
	INPUT VOLTAGE	Sine-wave signal 2 kHz - 800 mV to input A(B) (EXT)

SETTINGS AND REQUIREMENTS	- Set A(B) to 0,1 mV/div (DC input coupling) - Press TRIG COUPL for p-p triggering - Turn LEVEL MTB fully clockwise and fully anti-clockwise - Check if the signal is well triggered over the complete LEVEL range - Set the LEVEL MTB control in its mid-position - Start of signal display must be in the vertical centre - Press TB TRIG (TRIG mode) - Press SLOPE MTB - Check if the sine-wave signal is inverted and is triggered on the negative slope. - Press SLOPE MTB once again - Set A(B) to 50 mV/div (16 div. trace height) - Turn the LEVEL MTB - Check if the LEVEL range is > +or- 8 div. and if the signal is triggered on the positive slope. - Set A(B) to 0,1 V/div - Check if NOT TRIG'D is on, if the LEVEL control is set in its extreme positions - Remove input signal - Apply the sine-wave signal of 2 kHz, 1,6 Vpp to EXT - Select EXT (MTB trigger source) - Press TRIG VIEW. (TRIG VIEW and A(B) on) - Turn the LEVEL MTB - Check if the LEVEL range is > +or- 0,8 V (+or- 8 div.)
MEASURING RESULTS	

---

*	SUBJECT	Trigger Sensitivity (MTB)
	TEST EQUIPMENT	Sine-wave generator (SG503)
	INPUT VOLTAGE	Sine-wave signal 10 MHz-(50 MHz)-(100 MHz) to input A (B) (EXT)

SETTINGS AND REQUIREMENTS

- Press AC/DC (input coupling of A(B) to DC)
- Press TB TRIG MODE for TRIG mode
- Press TRIG COUPL for DC trigger coupling
- Apply a sine-wave signal of 10 MHz approx. 250 mVpp to input A(B)
- Set A(B) to 0,2 V/div.
- Decrease amplitude of input signal
- Turn LEVEL MTB
- Check if the signal is well-triggered at amplitudes $\geq$ 0,5 div.
- Decrease the frequency of the input signal to 50 kHz
- Check if the signal stays well triggered at amplitudes $\geq$0,5 div.
- Increase the frequency of the input signal up to 50 MHz.
- Decrease amplitude of input signal to approx 1 div.
- Turn LEVEL MTB
- Check if the signal is well-triggered at amplitudes $\geq$ 1 div.
- Increase the frequency of the input signal up to 100 MHz
- Decrease amplitude to approx 2 div.
- Check if the signal is well-triggered at amplitudes $\geq$ 2 div.
- Remove input signal
- Apply a sine wave signal of 100 MHz, 500 mVpp to input EXT (via external 50 Ohm terminator)
- Select EXT (MTB trigger source) with TRIG or X SOURCE
- Press TRIG VIEW, (TRIG VIEW and A(B) on).
- Turn LEVEL MTB
- Check if a well triggered sine-wave of 5 div. (500 mV) is displayed.
- Decrease amplitude of input signal
- Check if the signal is well triggered at amplitudes $\geq$ 500 mV (adjust LEVEL MTB)
- Decrease the frequency of the input signal to 50 MHz and the amplitude to 150 mV
- Check if the signal is well triggered (adjust LEVEL MTB)
- Decrease the frequency of the input signal to 10 MHz or lower
- Decrease the amplitude to 50 mV
- Check if the signal is well-triggered

MEASURING RESULTS

*	SUBJECT	Trigger sensitivity TVL-TVF
	TEST EQUIPMENT	TV pattern generator with video output (PM5518)
	INPUT VOLTAGE	Video signal to input A (B)
	SETTINGS	- Press TB TRIG mode for TRIG mode - Press AC/DC for DC input coupling - Apply a video signal to input A(B) with an amplitude of 0,7 div. sync. pulse amplitude - Press TRIG COUPL for TVL and TVF
	REQUIREMENTS	- Check for a stable triggering on TVL and TVF at sync. amplitudes of >0,7 div.
	MEASURING RESULTS	

2.4.7 DTB TRIGGERING (characteristics, section 2.4.2)

*	SUBJECT	DTB Trigger sources and trigger coupling
	TEST EQUIPMENT	Square-wave generator
	INPUT VOLTAGE	Square-wave signal 1 kHz, 4 div. trace height to input A(B) (EXT)
	SETTINGS AND REQUIREMENTS	- Set A(B) to 0,2V/div. - Press TB SELECT to select MTBI - Press DTB TRIG to select STARTS mode - Set MTB to 0,5 ms/div - Set DTB to 50 us/div - Set the delay to 2 ms with the DTM control - Turn LEVEL DTB - Check if the intensified part stays triggered and starts on the fifth vertical line - Press DTB to select A(B) - Check if the delay time is given in div. (4 div) - Turn LEVEL DTB - Check that in the extreme positions of the LEVEL control the DTB is not triggered. - Press TRIG DTB; check if A and B in composite are selected (DTB stays triggered) - Press TRIG DTB; check if B is selected as trigger source (DTB not triggered) - Press TRIG DTB; check if DTB is triggered via EXT (input signal also to input EXT) - Press TRIG DTB 3 times; check if A is selected
	MEASURING RESULTS	

---

*	SUBJECT	DTB Trigger Sensitivity
	TEST EQUIPMENT	Sine-wave generator (SG503)
	INPUT VOLTAGE	Sine-wave signal 10 MHz (50 MHz) (100 MHz) to input A(B) (EXT)
	SETTINGS AND REQUIREMENTS	- Press TB SELECT; select MTBI - Press DTB TRIG; select A(B) as trigger source - Set MAIN B to 0,5 us/div - Set DEL´D TB to 50 ns/div - Turn LEVEL DTB to get a well triggered intensified part - Check the DTB trigger sensitivity according the procedure given in section 6.3 * The EXT trigger sensitivity must be checked via channel A (input signal to EXT and A) * Read DTB instead of MTB
	MEASURING RESULTS	

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*	SUBJECT	DTB Slope selection and Level control range
	TEST EQUIPMENT	LF Sine-wave generator
	INPUT VOLTAGE	Sine-wave signal 2 kHz - 800 mVpp to input A(B) (EXT)
	SETTINGS AND REQUIREMENTS	- Set A(B) to 0,1 mV/div (8 div) - Select MTBI with TB SELECT - Set MAIN TB to 0,2 ms /div and DEL´D TB to 5 us/div. - Press DTB TRIG: source A(B) - Turn LEVEL DTB for a well triggered intensified part. - Press SLOPE DTB - Check if the intensified part is on the negative slope. - Press SLOPE DTB (positive triggering) - Set DEL´D TB to 0,1 ms/div. - Set A(B) to 50 mV/div. - Turn LEVEL DTB - Check if the LEVEL DTB range is > +or- 8 div.

2.4.8 AUXILIARY INPUTS AND OUTPUTS

*	SUBJECT	Z-MOD Sensitivity
	TEST EQUIPMENT	Square-wave generator
	INPUT VOLTAGE	Square-wave signal, 1 kHz, duty cycle 50%, amplitude 0...5 Vpp to input A and Z-in (rear side)
	SETTINGS AND REQUIREMENTS	- Set MAIN TB to 0,5 ms/div. - Set the trace of A in mid-position - Select DC for channel A Input coupling - Apply square-wave signal of 2,5 Vpp, 1 kHz to input A and Z-in. (base line 0 V) - Check if only the bottom half of the square wave signal is displayed (500 us blanking and 500 us unblanking) - Decrease the amplitude of the input signal to 1 Vpp. - Set A to 0,5 V/div. - Check if the top half of the square-wave signal is visible with a lower intensity and will be completely unblanked at an input voltage of < 0,8 V
	MEASURING RESULTS	

*	SUBJECT	CAL Frequency and output voltage
	TEST EQUIPMENT	-
	INPUT VOLTAGE	CAL output signal to input A
	SETTINGS	- Press 0 of channel A - Set the trace in the centre of the screen - Press 0 of channel A - Select DC of A input coupling
	REQUIREMENTS	- Check if a positive going square wave signal is displayed of 1,2Vpp, frequency 2 kHz
	MEASURING RESULTS	

3 SOLDERING AND DESOLDERING OF SURFACE MOUNTED DEVICES ON UNIT 8

3.1 INTRODUCTION

This description gives you a method for replacing surface mounted devices (SMD´s) and incorporates subjects such as:
- required tools and materials.
- how to arrange the S.M.D.-workshop. (see figure 3.1.)
- general hints for S.M.D.-handling.
- interchanging S.M.D.´s on unit 8

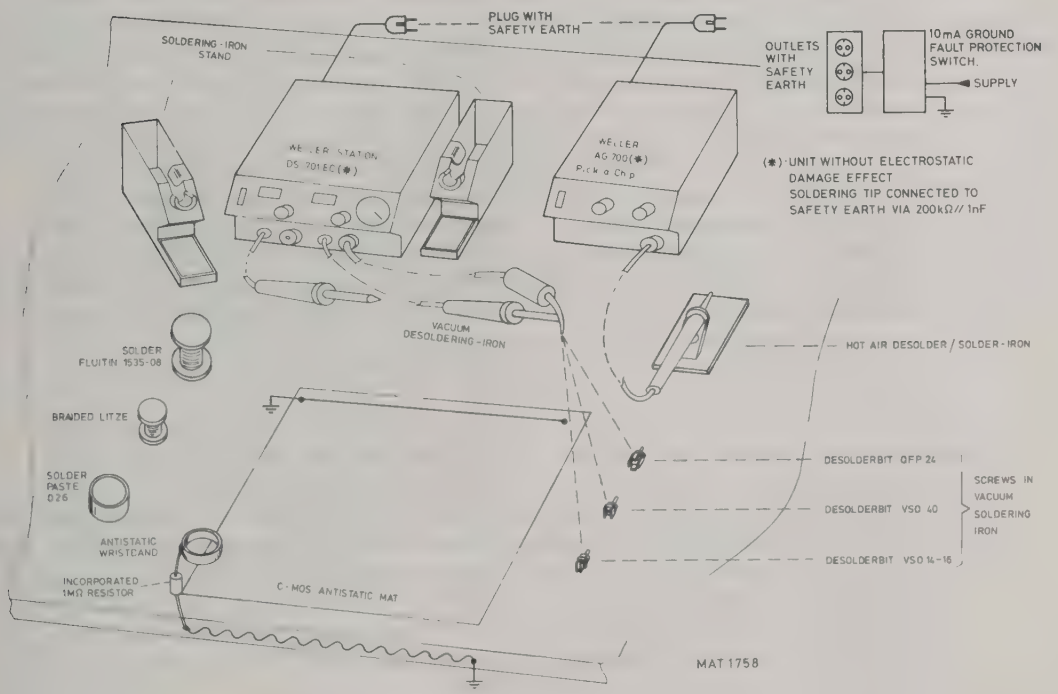


Fig.3.1 Arrangement of working area for S.M.D. exchange.

3.2 REQUIRED TOOLS AND MATERIALS

The following tools are necessary:
- A hot-air soldering/desoldering station for components with two or three leads: Weller AG 700 pick-a-chip.
- A vacuum, temperature controlled, soldering/desoldering station for components with four or more connections: Weller DS 701 EC.
- Desoldering accessories that can be attached to the Weller DS 701 EC-equipment: for dual-in-line S.M.D.´s VSO 40 (with 40 connections such as used on the LCD-unit) the type with Weller ordering code 587 13 703.
- A working area that has been secured against electro static discharge (E.S.D.).
- A pair of tweezers.

NOTE: The Weller equipment can be ordered via your local Weller-dealer.

The following material is necessary:
- "Fluittin" solder diameter of 0,8mm, 15/35, Sn Pb 60.
- Solder paste 026.
- Components. Since not all the components are marked, they must be kept in their original packing in order to avoid interchanging them.
- Desoldering braided wire.

3.3 GENERAL HINTS FOR S.M.D.-MOUNTING.

- Protection against E.S.D.: since the working area must be suitable for repair of MOS-devices, some precautions must be taken (see figure 3.1).
  All repairs must be done earthened which means that the repair surface, the soldering iron and the technician must be connected to the earth potential. This is achieved by using a C-MOS antistatic mat that must be connected to earth. The service-technician is connected to earth by wearing an antistatic wristband.-Components: desoldered components cannot be used again since desoldering is done at a temperature of 350 degrees Celcius while they can only whitstand 240 degrees Celcius for max. 10 sec.
  Keep the new components as long as possible in their original packing in order to avoid damage and mixing up new and old S.M.D.´s.
- For an optimal supply of heat a working area must be uses that does not lead away the heat: the antistatic mat in figure 3.1. meets this requirement.

3.4 INTERCHANGING THE SMD´S ON UNIT 8

Use the equipment Weller DS 701 EC and attach the suitable desoldering piece for VSO 40. Then proceed as follows:
- Adjust the desoldering temperature to 350 degrees Celcius and place the desoldering piece on the IC that has to be removed. (Take care that all connections of the IC are equally heated up).
- Switch the vacuum on and lift the component from the pcb
- Clean the pcb tracks, on which the new component has to be soldered, with braided wire or with the use of the vacuum desoldering equipment DS 701 EC.
- Put solder paste on the connections of the new component and position it on the pcb.
- Position the component by soldering first the outside connections in a crosswise manner. Soldering temperature must be 240 degrees Celcius. Keep the soldering time as short as possible.
- Solder now the other connections.

- If necessary you must remove superfluons rests of solder with the use of braided wire.

4. SERVICE MENU´S

The built-in service menus offer you the ease of several measuring and checking aspects in the instrument. You can enter this menu by performing the following action: Press the MENU softkey and keep it pressed. Then press the AUTO SET softkey. Now the LCD should indicate "1", "2" and "3" and the different service menu modes are accessible. The main service menu can be left again by pressing the AUTO SET pushbutton.

SERVICE MENU 1 - CHECKING AND ADJUSTING OFFSET CONTROLS
This menu helps to check and adjust the offsets in the different circuits. To enter this mode press "V" of channel A UP-DOWN control. Stepping through the menu (step 1.0...step 1.8) is performed by the MENU softkey. Return to the main service menu by pressing the AUTO SET pushbutton. A full description is given in the Service manual, chapter 13.

SERVICE MENU 2 - BRIEF CHECKING PROCEDURE
This menu gives a virtually immediate assurance of correct operation. The most important functions and correct operation of all potentiometer controls can be checked in a 10-step operation. To enter this mode press "V" of channel B UP-DOWN control. Stepping through the menu (step 2.0...step 2.9) is performed by the MENU softkey. Return to the main service menu by pressing the AUTO SET pushbutton.
A full description is given in the Operating Manual, chapter 3.4.

SERVICE MENU 3 - LCD CHECK
This menu offers the possibility to view all relevant LCD segments. In this way possible defective LCD segments can be found. To enter this mode press "S" of the DTB UP-DOWN control. Then step through this mode by pressing the MENU softkey untill step 3.9 is selected. This mode can only be left by pressing the MENU softkey another time.

5. OPTIONS

The following chapter contains the complete description of the possible options for PM3055. It can be filed under chapter 17 of the Service manual.

Contents: 5.1. Y-OUT
5.2. MTB gate, DTB gate and MTB sweep

5.1 Y-OUT

5.1.1 Characteristics

CHARACTERISTICS	SPECIFICATION	ADDITIONAL INFORMATION
* Y-out	via channel A	
Defl. coeff.	100 mV/div. +/- 10%	at R_{load} > 10 kOhm
	50 mV/div. +/- 10%	at R_{load} = 50 Ohm
* Bandwidth	< 50 MHz	
Amplitude at 6 div., 50 MHz input signal		- 3 dB, input 6 div. sinewave
* Pulse aberrations		
LF pulse drop or tilt	< 2%	at R_{load}= 500 Ohm
	< 3%	at R_{load}> 10 kOhm
		5 div. pulse; +or- 2,5 div. from screen centre.
* HF pulse aberrations	< 6%	5 div. pulse (ac coupled)
* Dyn. range	+or- 12 div.	at 10 MHz
	> 6%	at 50 MHz
* DC output level	0 V	
Output drift ($10^{o}C$-$40^{o}C$)	< 50 mV	

5.1.2 Circuit description

The Y-OUT circuit receives its input current from the signal splitter D2002, pin 6 and 11 on the pre-amplifier unit. The symmetrical input is buffered by two common-base amplifiers V203. These two transistors are matched for a common Vbc to compensate temperature drift.
The symmetrical current signals are then converted into the asymmetrical Y-OUT voltage via the short-feedback amplifier N201-6,7,8. The amplitude of this Y-OUT voltage is the summation of the voltage across resistor R219 and R226. The offset can be adjusted to 0 V by means of potentiometer R201. Transistor V206 serves as the current source of this final stage.

5.1.3 Adjusting and checking procedure

Refer to figure 5.1 for location of the adjusting points.

Note: Be sure that the oscilloscope is well adjusted before starting this adjusting procedure.

Gain adjustment:
- Apply a 100 mV/1 kHz calibrated square-wave signal to input A.
- Connect the Y OUT output to input B by means of a coax cable.
- Press AUTO SET key.
- Set UP-DOWN ch. A to 20 mV.
- Set UP-DOWN ch. B to 0,1 V.
- Press AC/DC key ch. A for DC input coupling.
- Press AC/DC key ch. B for DC input coupling.
- Press ALT/CHOP key for chopped display.
- Press ADD/INVERT key for a channel A minus channel B display
- Adjust R209 for a straight line display (tolerance: +or- 1,5 subdiv.)

Offset adjustment:
- Apply a 100 mV/1 kHz calibrated square-wave signal to input A.
- Connect the Y OUT output to input B by means of a coax cable.
- Press AUTO SET key.
- Press 0 key ch. A.
- Connect a digital multimeter to the Y-OUT connection of the BNC socket and the BNC-ground.
- Adjust R201 so that the output voltage is 0 V (tolerance: +or- 10 mV)

Checking the gain:
- Apply a 100 mV/1 kHz calibrated square-wave signal to input A.
- Connect the Y OUT output to input B by means of a coax cable.
- Press AUTO SET key.
- Set UP-DOWN ch. A to 20 mV.
- Set UP-DOWN ch. B to 0,1 V.
- Press AC/DC key ch. A for DC input coupling.
- Press AC/DC key ch. B for DC input coupling.
- Press A/B key for only ch. B display.
- Ensure that the amplitude of the displayed signal is 5 div. (tolerance: +or- 1,5 subdiv.)

- Terminate ch. B with 50 Ohm.
- Set UP-DOWN ch. B to 50 mV.
- Ensure that the amplitude of the displayed signal is 5 div. (tolerance: +or- 1,5 subdiv.

HF square-wave response adjustment:
- Apply a 120 mV/1 MHz calibrated square-wave signal with rise time faster than 1 nsec to input A.
- Connect the Y OUT output to a PM3295 oscilloscope means of a coax cable. (Input: 50 Ohm, sensitivity: 50 mV/div)
- Press AUTO SET key
- Set UP-DOWN ch. A to 20 mV.
- Press AC/DC key ch. A for DC input coupling.
- Ensure that the PM3295 displays a square wave signal of 6 div p-p approx.
- Adjust R223 and C203 for an optimal square-wave response.

Y-OUT bandwidth check:
- Apply a 120 mV/1 MHz sine-wave to input A.
- Connect the Y-OUT output to a PM3295 oscilloscope by means of a coax cable. (input: 50 Ohm, sensitivity: 50 mV/div).
- Press AUTO SET key.
- Set UP-DOWN ch. A to 20 mV.
- Press AC/DC key ch. A for DC input coupling.
- Ensure that the amplitude of the displayed signal of the PM3295 oscilloscope is 6,0 div.; if necessary, readjust the amplitude of the input signal.
- Now, increase the frequency of the input signal to 50 MHz.
- Ensure that the amplitude of the displayed signal on the PM3295 is at least 5,0 div. p-p.

Checking the dynamic range:
- Apply a 0,25 V/50 MHz sine-wave to input A.
- Connect the Y-OUT output to PM3295 oscilloscope by means of a coax cable. (input: 50 Ohm, sensitivity: 200 mV/div).
- Press AUTO SET key.
- Set UP-DOWN ch. A to 20 mV.
- Press AC/DC key ch. A for DC input coupling.
- Ensure that the displayed signal is shown without distortion or clipping.

- Change the input signal to 0,52 V/10 MHz sine wave.
- Change UP/DOWN ch. A to 20 mV.
- Ensure that the displayed signal is shown without distortion or clipping.

5.1.4 Parts list

POS.NR	DESCRIPTION	ORDERING CODE
C201	10nF -20+150% 100V	4822 122 31414
C202	100pF -2% 100V	4822 122 31316
C203	10pF TRIM CAP	5322 125 11013
C204	1nF -10% 100V	4822 122 30027
C251	68uF -10+50% 16V	4822 124 20689
C252	10nF -20+50% 100V	4822 122 31414
C253	10nF -20+50% 100V	4822 122 31414
C254	68uF -10+50% 16V	4822 124 20689
C256	10nF -20+50% 100V	4822 122 31414
C257	10nF -20+50% 100V	4822 122 31414
R201	2K2 25% 0,3W	5322 105 20033
R202	16K2 1% MR25	5322 116 53589
R203	1K33 1% MR25	5322 116 53512
R204	1K33 1% MR25	5322 116 53512
R206	100E 1% MR25	5322 116 53126
R207	100E 1% MR25	5322 116 53126
R208	7K5 1% MR25	5322 116 53028
R209	2K2 25% 0,3W	5322 105 20033
R211	348E 1% MR25	5322 116 53591
R212	51E1 1% MR25	5322 116 53213
R213	51E1 1% MR25	5322 116 53213
R214	23K7 1% MR25	5322 116 53537
R216	287E 1% MR25	5322 116 53221
R217	287E 1% MR25	5322 116 53221
R218	100E 1% MR25	5322 116 53126
R219	825E 1% MR25	5322 116 53541
R221	6K19 1% MR25	5322 116 53263
R222	1K78 1% MR25	5322 116 53208
R223	470E 25% 0,3W	5322 105 20028
R224	10E 1% MR25	5322 116 52891
R226	825E 1% MR25	5322 116 53541
R227	1K33 1% MR25	5322 116 53512
R228	287E 1% MR25	5322 116 53221
R229	51E1 1% MR25	5322 116 53213
R231	1K21 1% MR25	5322 116 52952
R232	1K 1% MR25	5322 116 53108
R233	348E 1% MR25	5322 116 53591
R251	5E11 1% MR25	4822 116 52999
R252	5E11 1% MR25	4822 116 52999
R253	5E11 1% MR25	4822 116 52999
V201	BAW62	4822 130 30613
V202	BAW62	4822 130 30613
V203	BF324 select	5322 693 90465
V204	BAW62	4822 130 30613
V206	BF370	4822 130 42589
N201	CA3127E	5322 130 42627
X204	3-P SNG-90°	5322 265 30433
3x	50 Ohm bus conn.	5322 268 24116
3x	50 Ohm pen conn.	5322 268 14141

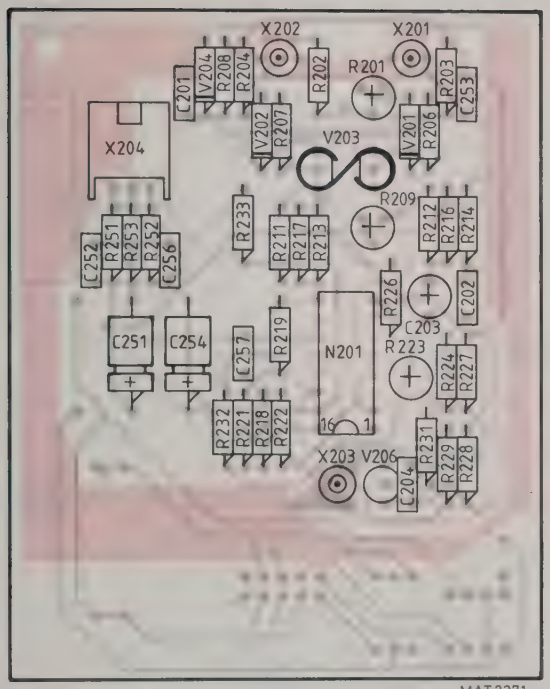


Figure 5.1 Y-OUT pcb

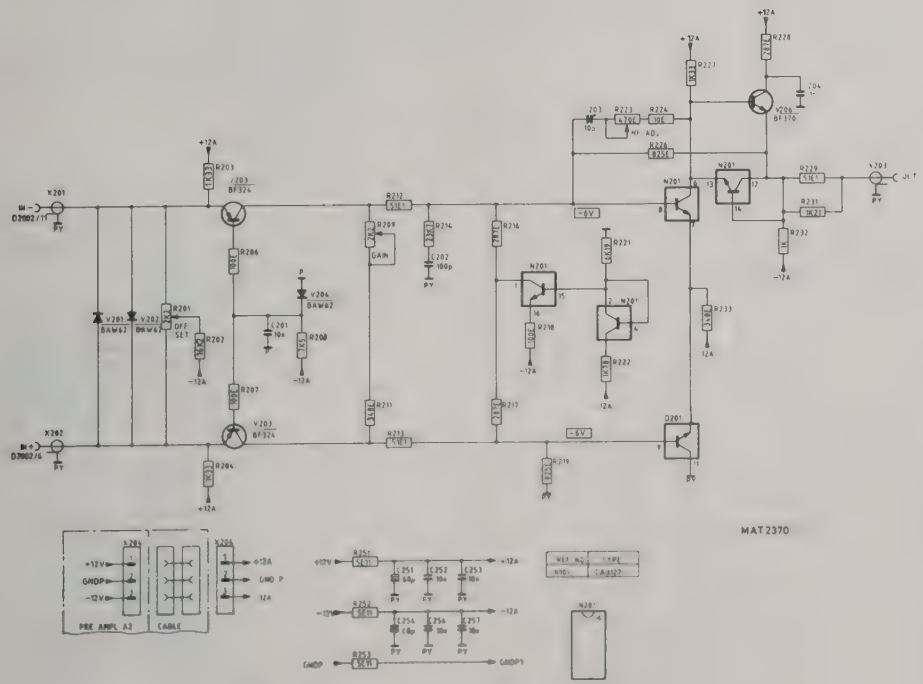


Figure 5.2 Circuit diagram of Y-OUT option

5.2 MTB GATE, DTB GATE AND MTB SWEEP

5.2.1. MTB gate

The BNC output socket gives a TTL-compatible signal, which is HIGH during the MTB sweep and LOW for other conditions.

Characteristics	Specification	Additional information
* Output voltage LOW	< 0,4 V	at +4 mA
* Output voltage HIGH	> 2,4 V	at -4 mA

5.2.2 DTB gate (PM3055, PM3056 only)

The BNC output socket gives a TTL-compatible signal, which is HIGH during the DTB sweep and LOW for other conditions.

Characteristics	Specification	Additional information
* Output voltage LOW	< 0,4 V	at +4 mA
* Output voltage HIGH	> 2,4 V	at -4 mA

5.2.3 MTB sweep

The BNC output socket gives the MTB sawtooth signal.

Characteristics	Specification	Additional information
* Output voltage	0,5 V/div. +or-2,5%	at R_{load} > 1 Meg-Ohm
* Linearity	< 3%	for definition, see MTB spec. in your Service manual.
* Output impedance	1 kOhm +or-2%	
* Offset voltage	< 250 mV	

5.2.4 Parts list

POS.NR	DESCRIPTION	ORDERING CODE
C421	10 nF -20+50% 100 V	4822 122 31414
C422	10 nF -20+50% 100 V	4822 122 31414
C423	10 nF -20+50% 100 V	4822 122 31414
R401	10 E 1% MR25	5322 116 52891
R402	10 E 1% MR25	5322 116 52891
R403	100 E 1% MR25	5322 116 53126
R404	100 E 1% MR25	5322 116 53126
R406	1 E 1% MR25	4822 116 52167
R407	10 E 1% MR25	5322 116 52891
R408	5k11 1% MR25	5322 116 53494
R409	5k11 1% MR25	5322 116 53494
R411	1 K 1% MR25	5322 116 53108
R421	5E11 1% MR25	5322 116 52999
R422	5E11 1% MR25	4822 116 52999
R423	5E11 1% MR25	4822 116 52999

POS.NR	DESCRIPTION	ORDERING CODE
V401	BC558B	4822 130 44197
V402	BC548C	4822 130 44196
D401	PC74HCT132P	4822 209 83044
3x 50 Ohm bus		5322 268 24116
3x 50 Ohm pin		5322 268 14141

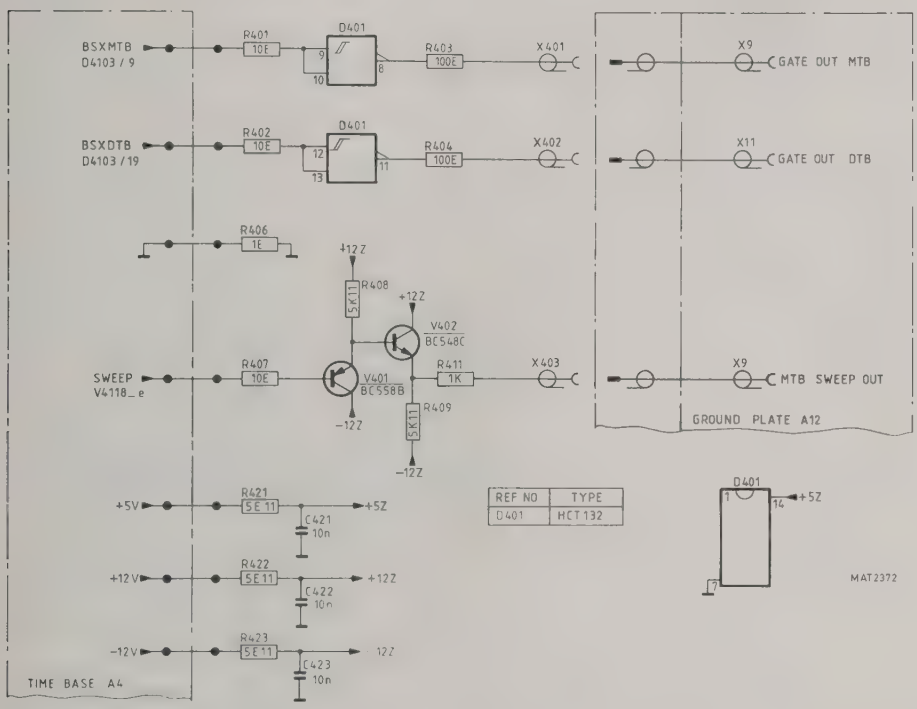


Figure 5.3 Circuit diagram of MTB gate, DTB gate and MTB sweep options

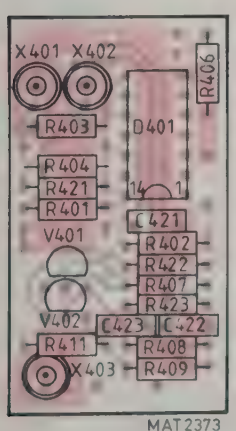


Figure 5.4 Pcb for MTB gate, DTB gate and MTB sweep

6. MODIFICATIONS

The following modifications have been introduced during introduction of the oscilloscope (DQ 600...DQ 1200)

6.1 UNIT 1 ATTENUATOR UNIT

* To eliminate cross talk, a capacitor of 10 nF (4822 122 31414) has been added between +17a to ground and +17b to ground.

6.2 UNIT 2 PRE-AMPLIFIER UNIT

* To increase the adjustement range of the N/I BAL potentiometer, resistor R2213 has been changed to 100 K - MRS25 (4822 116 52973)

* Capacitor C2225, C2226 and C2616 have been changed to 470 pF (4822 122 30034)
  Capacitor C2338, 470 pF (4822 122 30034) has been added between kathodes V2328, V2329 and ground.

6.3 UNIT 3 XYZ AMPLIFIER UNIT

* To improve the trace quality, capacitor C3216 has been changed into BZX79-C9V1 (4822 130 30862)

* To avoid temperature drift, the following modifications have been introduced:
  - C3112 cancelled
  - R3102 changed to 562E- MRS25 (5322 116 53214)
  - R3116 changed to 562E- MRS25 (5322 116 53214)
  - R3129 changed to 1K1 - MRS25 (5322 116 53108)
  - R3148 changed to 9K09- MRS25 (5322 116 53253)
  - R3149 cancelled

6.4 UNIT 4

* To increase the trigger amplifier bandwidth, resistors R4000 and R4006 have been changed to 75E- MRS25 (5322 116 53339).

* To improve the AUTO setting for the TV signals, resistor R4025 has been changed to 1K - MRS25 (4822 116 53108).

* To improve INTENS RATIO for all time base settings, the following components have been changed:
  - R4334 into 2K15 - MRS25 (5322 116 53239)
  - R4614 into 8K25 - MRS25 (5322 116 53267)
  - R4617 into 6K81 - MRS25 (5322 116 53252)
  - R4618 into 11K - MRS25 (4822 116 52907)
  - R4619 into 51K1 - MRS25 (4822 116 53121)
  - R4620 into 10K - MRS25 (4822 116 53022)

  Next capacitor C4110 has been added between +14V6 and D4102, pin 3.

  The hold-off circuit has been fully changed.
  A part of the new circuit diagram of Figure 7 of the service manual is shown in figure 6.1

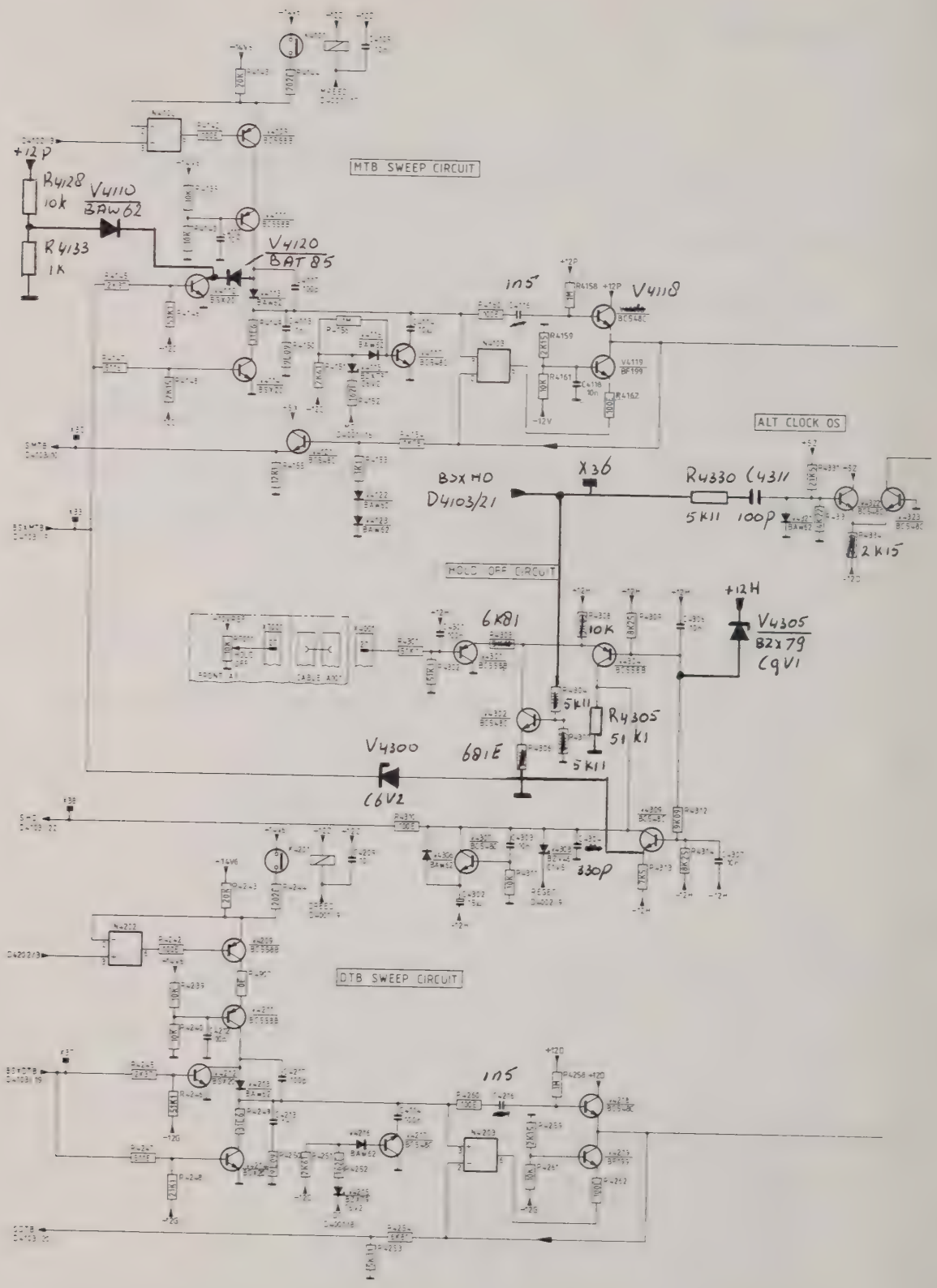


Fig. 6.2 Part of Time-base unit, showing the modified hold-off circuit.

The codenrs of the new components are:

C4116	1N5	(4822 122 31169)	
C4216	1N5	(4822 122 31169)	
C4304	330 pF	(.... ... .)	
C4311	100 pF	(4822 122 31316)	
R4128	10K - MRS25	(4822 116 51253)	new component
R4133	1K - MRS25	(4822 116 51235)	new component
R4303	6K81- MRS25	(4822 116 51252)	
R4304	5K11- MRS25	(5322 116 54595)	
R4305	51K1- MRS25	(5322 116 50672)	new component
R4306	681E- MRS25	(4822 116 51233)	
R4307	5K11- MRS25	(5322 116 54595)	
R4308	10K - MRS25	(4822 116 51252)	
V4110	BAW62	(4822 130 30613)	new component
V4120	BAT85	(4822 130 31983)	new component
V4300	BZX79-C6V2	(4822 130 34167)	new component
V4305	BZX79-C9V1	(4822 130 30862)	new component
V4303	cancelled		

Also the following components have been changed:

C4127 into 10 pF	(4822 122 32185)	
C4839 into 12 pF	(4822 122 31056)	
C4841 into 12 pF	(4822 122 31056)	
R4102 into 4K64-MRS25	(5322 116 50484)	
R4103 into 11K -MRS25	(5322 116 54623)	
R4104 into 100K-MRS25	(4822 116 51268)	

V4166 has been cancelled. Reason: the VERT IIC line is not used in the instrument.

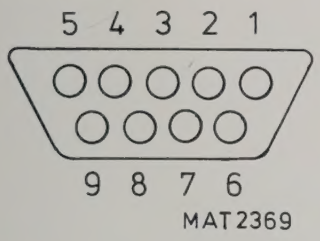
Unit 6 Power supply unit

* To avoid Z-modulation, C6214-470 pF (5322 122 50086) has been added between X6008-3 and ground

* To obtain an improved CAL square-wave signal the following components have been changed:
  - L6002 is cancelled
  - R6500 is cancelled
  - V6006 is replaced by a wire-bridge
  - Series connection of C6018-4N7 (4822 122 31125) and R6019-21E5, MRS25 (5322 116 50677) connected across T6001-1,2.
  - C6134, 1 NF (4822 122 30027), connected across V6131.

7. REMOTE CONTROL SOCKET

Connector: D-subminiature connector with 9 female contacts.



Connector specification:

Connector	Name	Additional information
1	SDA	Bidirectional data line for communication according to Philips IIC bus protocol.
2	SCL	Bidirectional clock line for communication according to Philips IIC bus protocol.
3	GND	Ground for power supply and communication signals.
4	FOOTN	Remote AUTO SET. Command line to initiate the AUTO SET function.
5	REMRQN	REMote ReQuest Not. Command line to initiate transfer to/from oscilloscope.
6	+5V	
7	GND	
8	+5V	
9	GND	

The remote control socket can be used for:

- Remote AUTO SET, to initiate the AUTO SET function pin 4 must be connected to GND.
- Connection to the Memory back-up PM8998.
- Connection to the IEEE interface box PM8953.